Intel® Flash Memory

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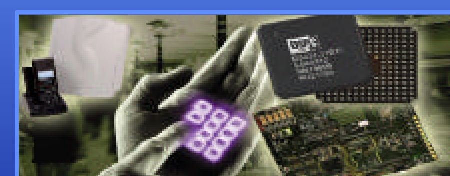
2/8/01

Wireless Communications and Computing Group (WCCG)

Flash Memory

Handheld Computing

DSPC



Cellular Components

Be the preeminent building block supplier to the rapidly growing wireless internet economy

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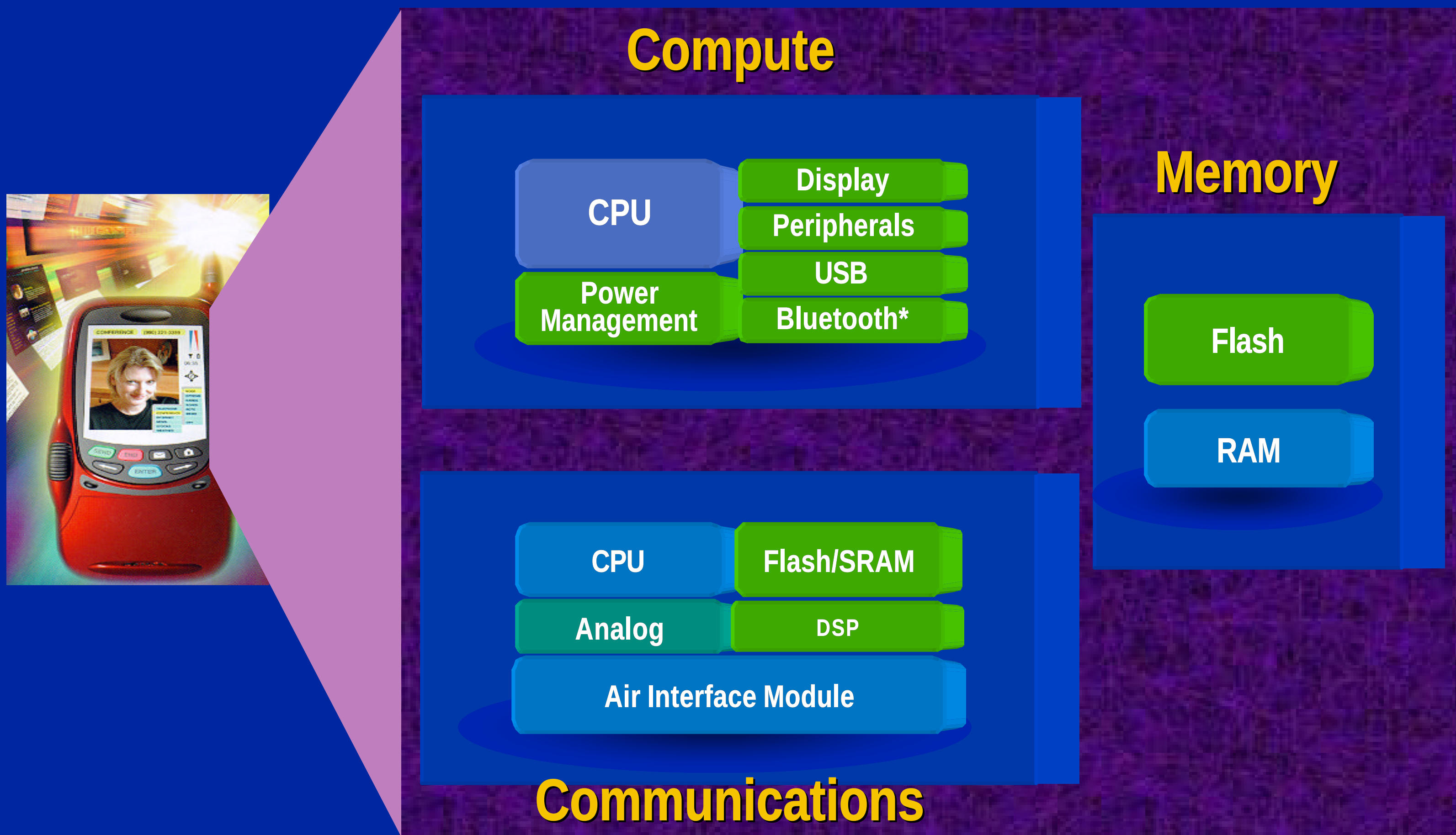
Intel® Personal Internet Client Architecture (Intel® PCA)



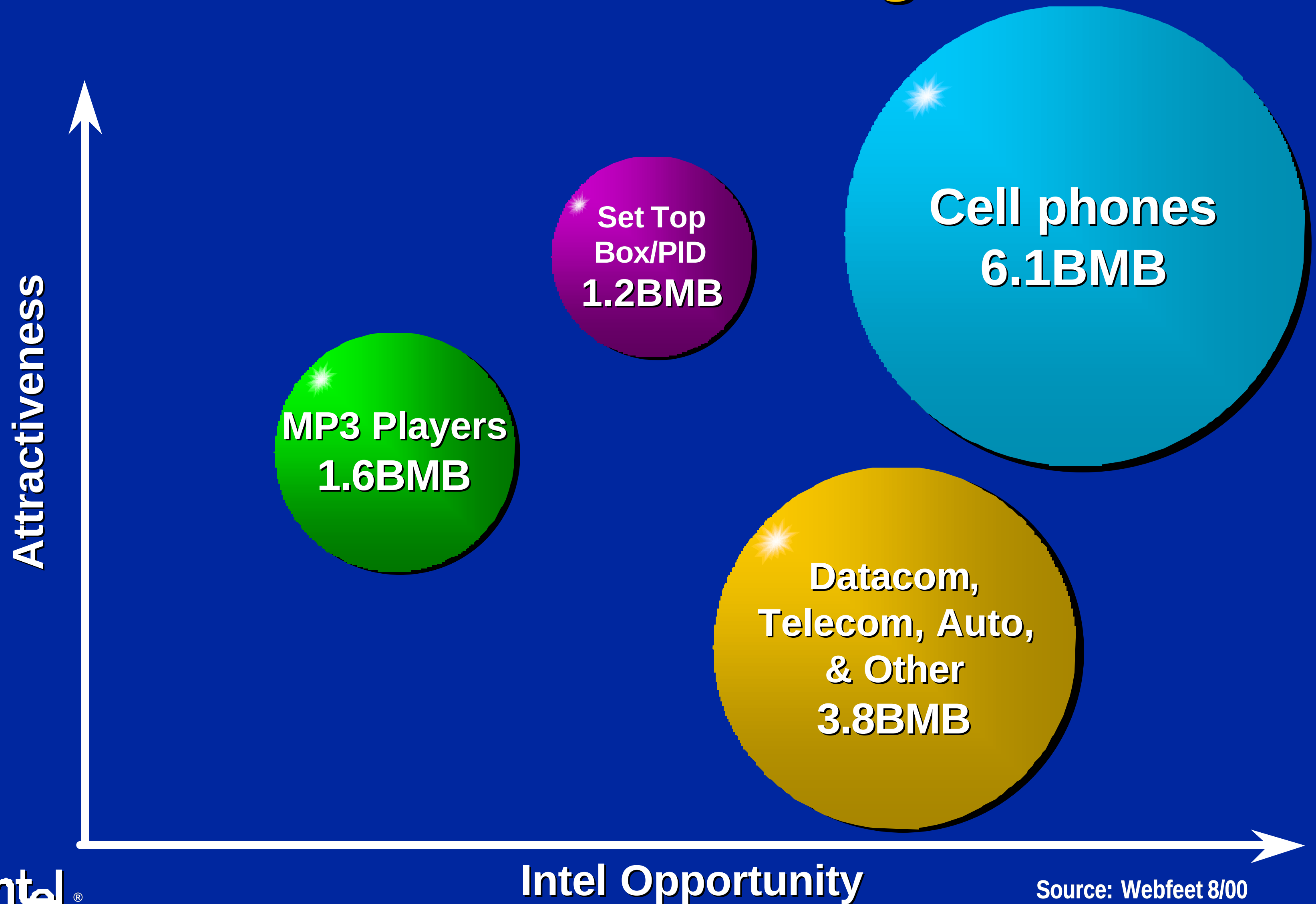
Independent Compute and Communication Stacks

Intel® Flash Memory Opportunity

- Focus on high growth markets
- Process & technology leadership
- Marketplace characteristics

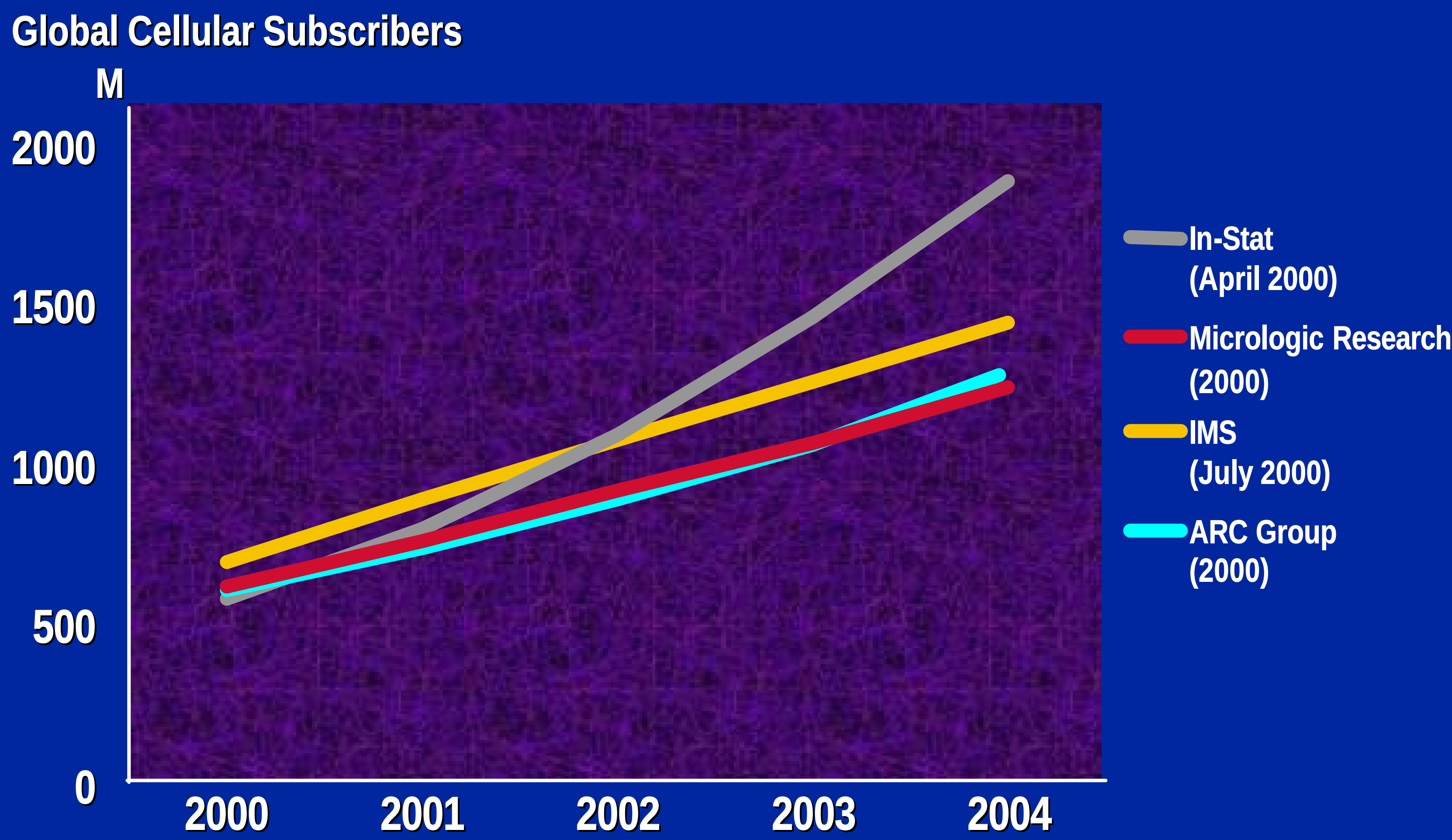
Focus on High Growth Markets:

NOR Flash Market Segments in ‘03



Source: Webfeet 8/00

Cellular Market a Huge Opportunity for Flash Memory



~700M subscribers in 2000

1.4B by 2004

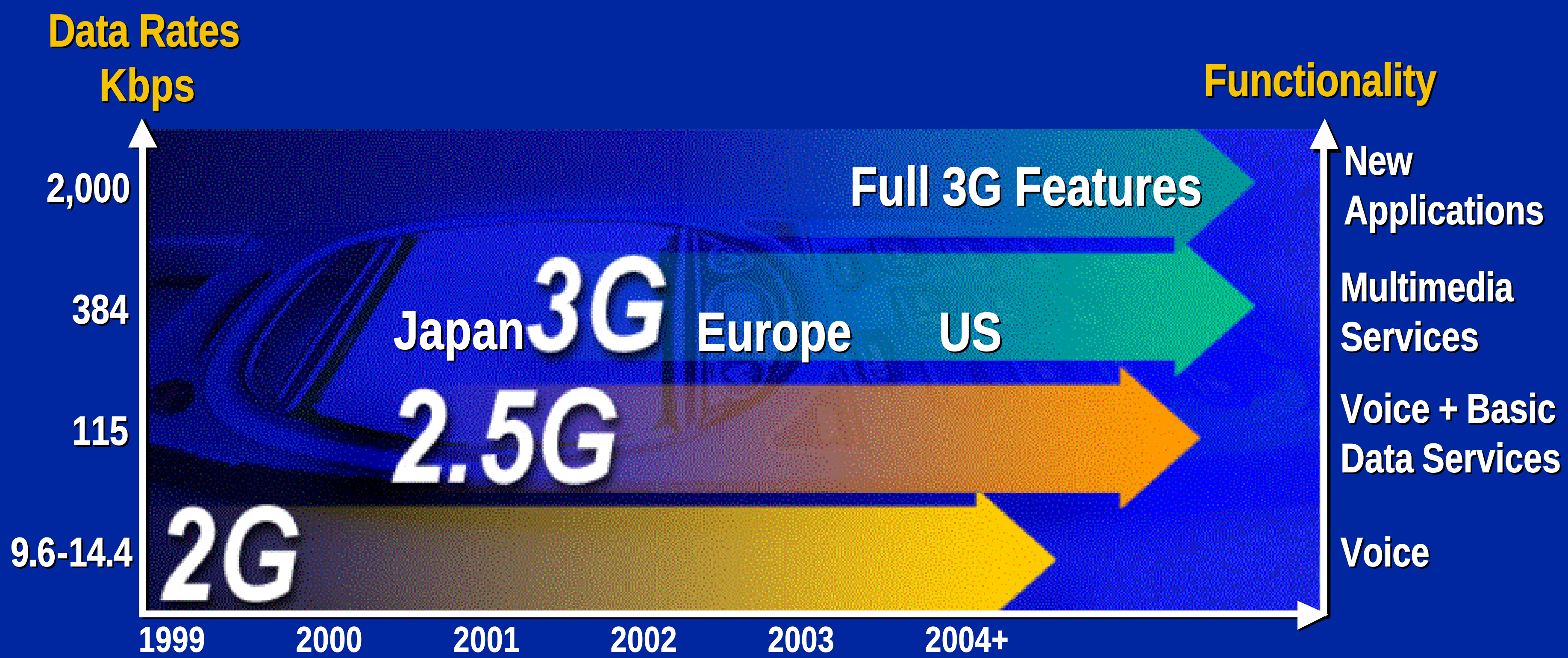
Cellular Subscriber Penetration

Region	% in '00
West Europe	61.0%
North America	37.3%
Latin America	13.8%
Caribbean	9.9%
Middle East	9.8%
East Europe	7.1%
Asia Pacific	6.4%
Japan	*46.4%*
China	*6.1%*
Australia, New Zealand, Hong Kong, Singapore, Taiwan, S. Korea	*62.6%*
Other	*3.8%*
Africa	1.6%

Source: Intel

- **Penetration today ~12% global population**
- **Geographic analysis supports 2X global subscriber base by '04**
- **Service trends**
  - New subscribers still outpacing replacement handsets
  - Displacing wired phones
  - Prepaid phones
  - Teens/twenty somethings - Internet generation

More Features, More Flash



Transition from Voice → Voice + Data Drives More Storage

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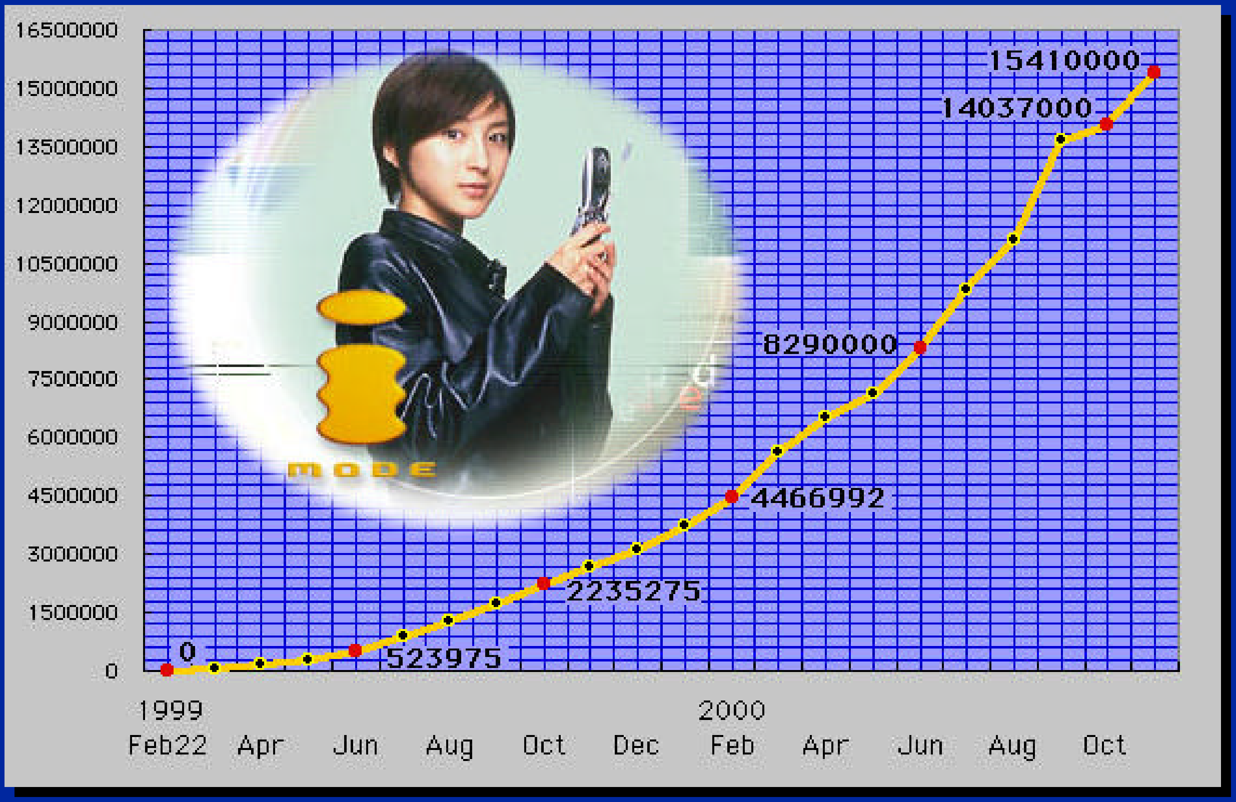
Internet Enabled Cellular = Density Growth

Average Mb shipped by Intel into phone by region in 2000

Japan	**42.7**
Asia-Pacific	**24.8**
Europe	**18.3**
Americas	**15.6**



Source: NTT DoCoMo

"The number of i-mode customers exceeded <u>18,432,000</u> as of 1/28/01"

NTT DoCoMo

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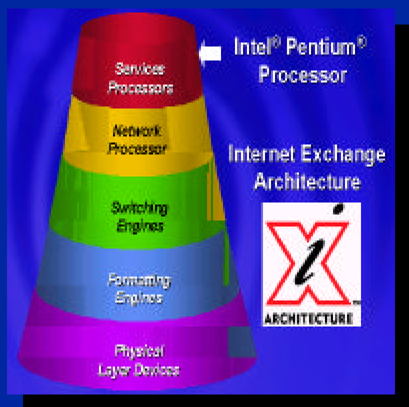
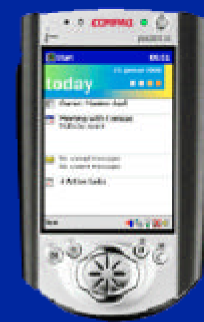
Focus on High Growth Markets:

Communications





Personal Information Devices (PID)

- Internet Tablets
- PDAs
- Organizers
- Handhelds

Communications Infrastructure

- Routers
- Switches
- Blades
- Wireless Base stations

Set-top Boxes

- Digital Satellite & Cable
- HDTV
- Cable Modems
- Dedicated Internet Terminals

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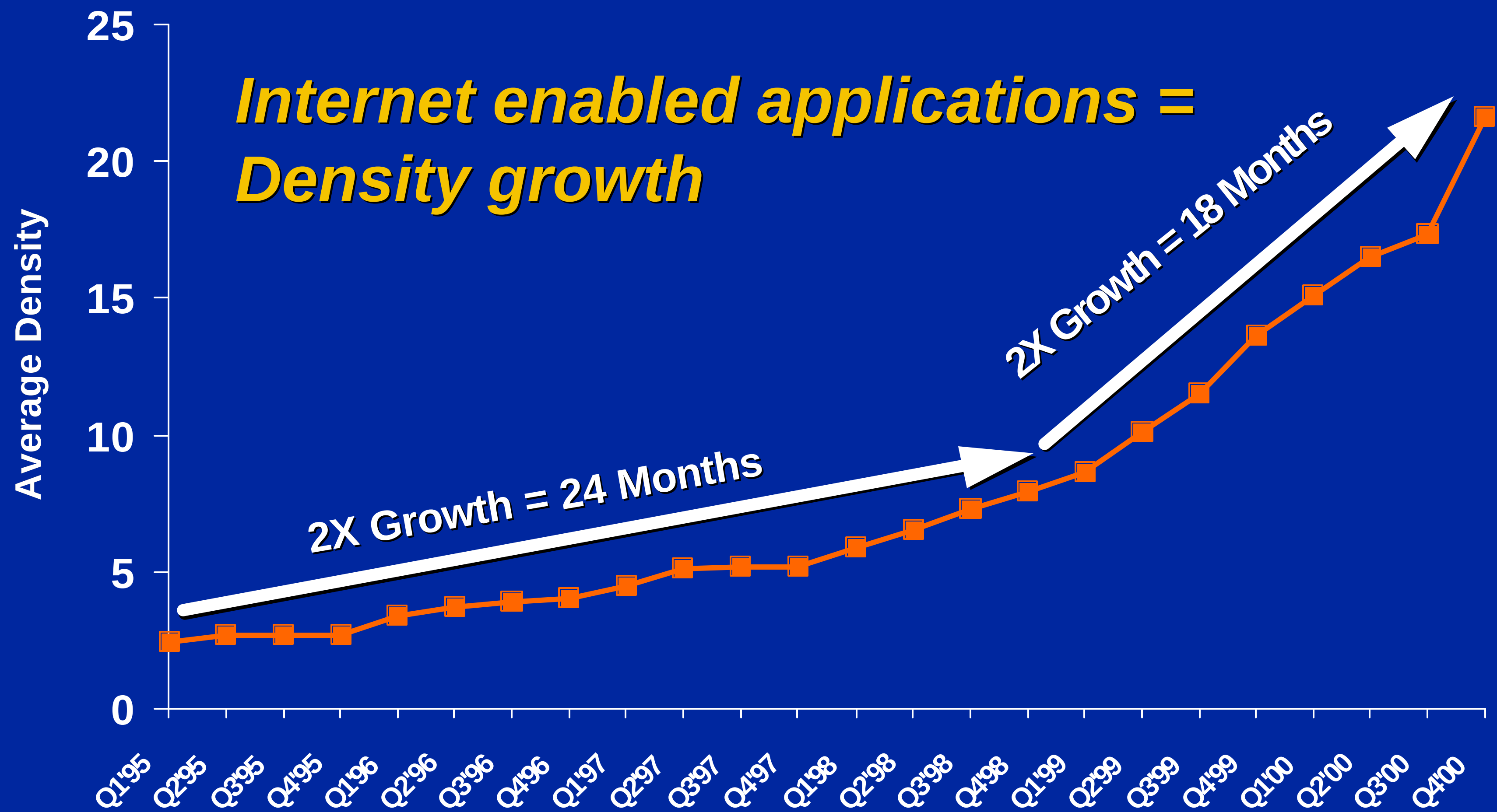
Intel® Flash Density Growth



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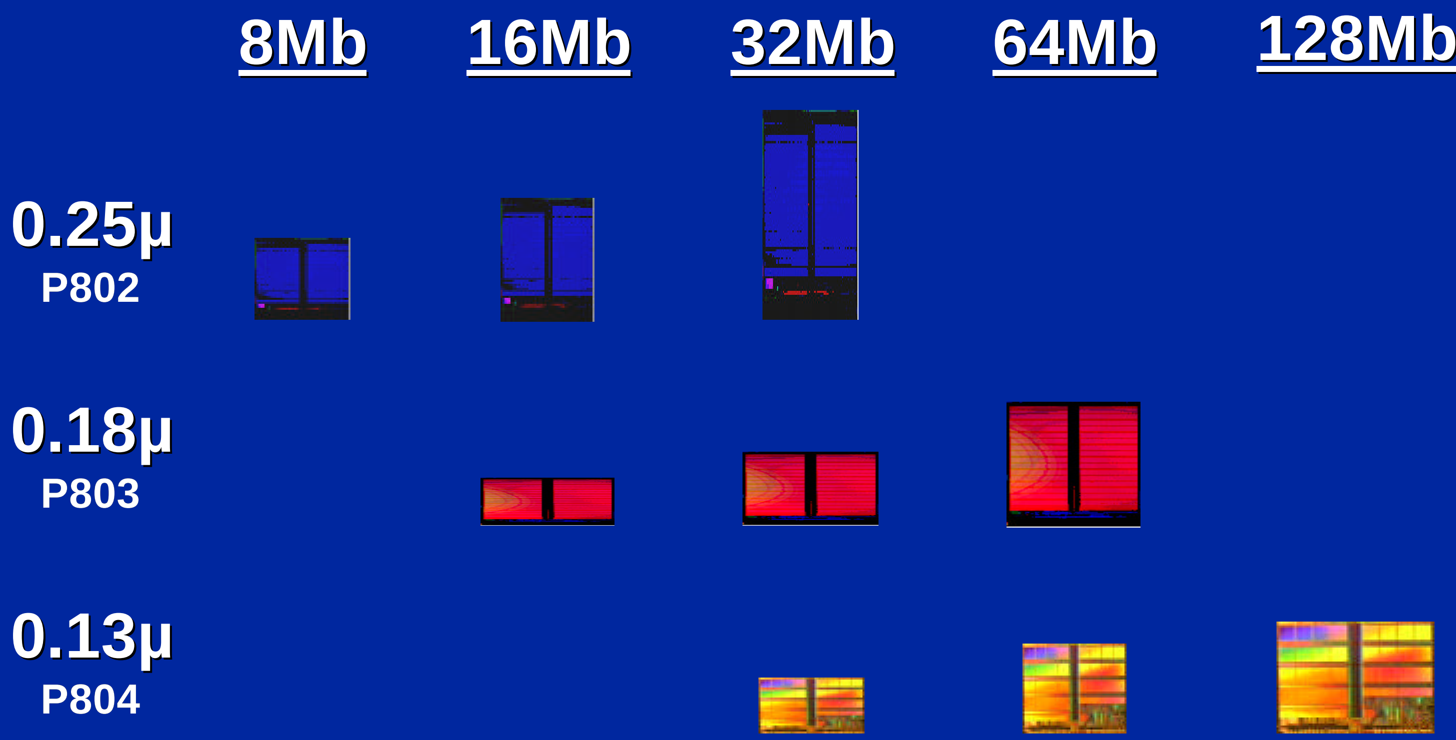
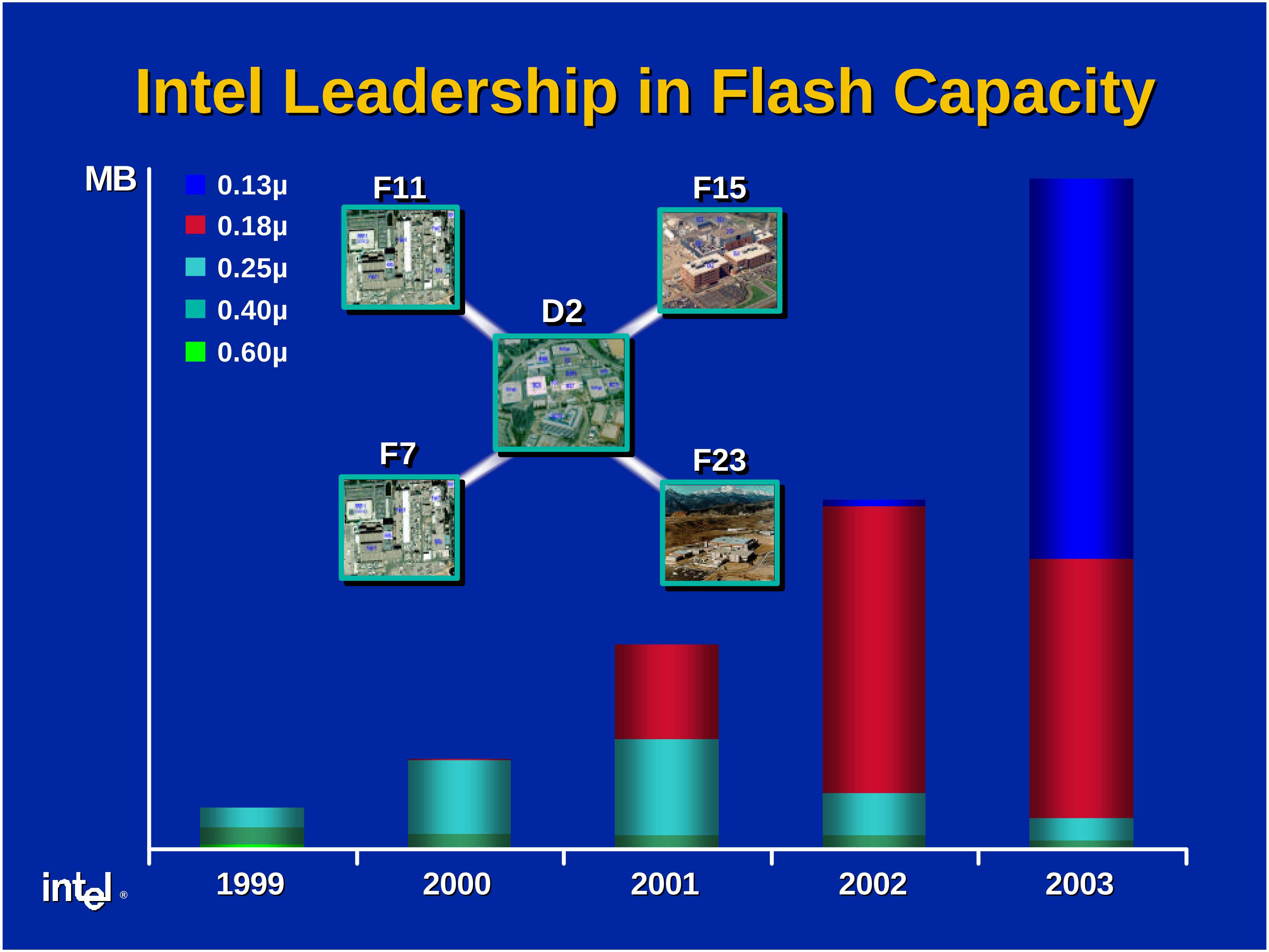
Intel Leadership in Flash Lithography



**Relative die sizes of 1bit/cell flash*

Optimized for Higher Density/Lower Cost


Intel Leadership in Flash Capacity
MB
0.13µ
0.18µ
0.25µ
0.40µ
0.60µ
F11
F15
D2
F7
F23
1999
2000
2001
2002
2003
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Intel Leadership in Design Technology

Intel® StrataFlash™ Memory

- Highest density/lowest cost architecture
  - Multi-level cell technology
  - 2X the bits in 1X the space
- Wide acceptance
  - STB, MP3, Handheld, Cellular, Datacom
  - 23% of bits shipped in Q4'00
- Future 1.8V product for cellular phones

Intel® Flash Memory Opportunity

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Applications Require Specific Flash Solutions

- Vendor specific devices
  - No “universal sockets”
  - OEMs typically have only 1 or 2 vendors/design
- Unique packaging requirements
  - Marketplace requirements dictate different solutions
- NAND vs. NOR technology
  - NAND = Data only; NOR = Code+Data
- Software support for data storage
  - Intel® Persistent Storage Manager
  - Intel® Flash Data Integrator

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Intel® Flash Memory Long Term Agreements (LTAs)

- More than 10 top communications customers
  - Public announcements - Ericsson, Cisco, Siemens
  - Generally 3 year agreements
  - Significant buying % commitment
  - Technical collaboration for future products & designs
- ~90% Intel flash supply currently under LTA
- Other flash industry players announced LTA relationships

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Summary

- Focus on high growth markets
  - 1.4 Billion cellular subscribers by 2004
  - Internet enabled applications = density growth
- Process & technology leadership
  - First on 0.25µ and 0.18µ processes, 0.13µ in 2002
  - Intel® StrataFlash™ memory
- Stable marketplace characteristics
  - Applications require specific flash solutions
  - LTAs secured with top communication customers

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